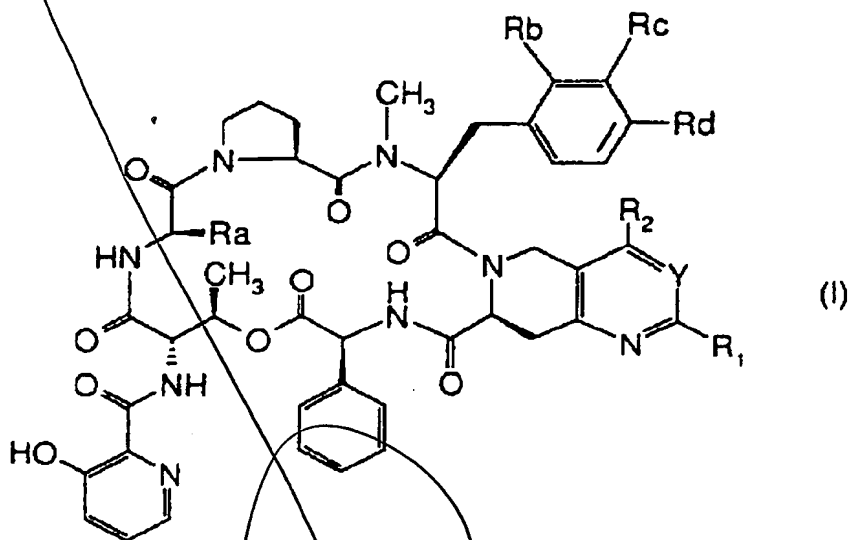


## CLAIMS

What is claimed is:

- 5 1. A group B streptogramin derivative of general formula:



in which

Y is a nitrogen atom or a radical  $=CR_3-$ ,

- 10  $R_1$  is a hydrogen atom, a radical alkyl (1 to 8 carbons), alkenyl (2 to 8 carbons), cycloalkyl (3 to 8 carbons), heterocyclyl which is saturated or unsaturated (3 to 8 members), phenyl, phenyl which is substituted (with one or more halogen atoms or hydroxyl, alkyl, alkyloxy,
- 15 alkylthio, alkylsulphanyl, alkylsulphonyl, amino, alkylamino or dialkylamino radicals) or a radical  $NR'R''$ ,  $R'$  and  $R''$ , which are identical or different, being capable of being hydrogen atoms or alkyl radicals (1 to 3 carbons), or being capable of forming together
- 20 with the nitrogen atom to which they are attached a 3-

to 8-membered heterocycle optionally containing another heteroatom chosen from oxygen, sulphur or nitrogen which is optionally substituted (with a radical alkyl, alkenyl (2 to 8 carbons), cycloalkyl (3 to 6 carbons),  
5 heterocyclyl which is saturated or unsaturated (4 to 6 members), benzyl, phenyl or phenyl which is substituted as defined above for the definition of  $R_1$ ),  
or alternatively when Y is a radical  $=CR_3-$ ,  $R_1$  may also be halomethyl, hydroxymethyl, alkyloxymethyl,  
10 alkylthiomethyl in which the alkyl portion is optionally substituted with  $NR'R''$ ,  
alkylsulphinylmethyl, alkylsulphonylmethyl, acyloxymethyl, benzoyloxymethyl, cyclopropylaminomethyl or  $-(CH_2)_nNR'R''$  (n being an integer from 1 to 4 and  $R'$   
15 and  $R''$  being defined as above), or alternatively if  $R_3$  is a hydrogen atom,  $R_1$  may also be formyl, carboxyl, alkyloxycarbonyl, or  $-CONR'R''$  for which  $R'$  and  $R''$  are defined as above,  
or alternatively when Y is a nitrogen atom,  $R_1$  may also  
20 be a radical  $(-XR^\circ$  for which X is an oxygen or sulphur atom, a sulphinyl or sulphonyl radical, or an NH radical and  $R^\circ$  is a radical alkyl (1 to 8 carbons), cycloalkyl (3 to 6 carbons), heterocyclyl which is saturated or unsaturated (3 to 8 members),  
25 heterocyclylmethyl (3 to 8 members) in which the heterocyclyl portion is attached to the methyl radical by a carbon atom, phenyl, phenyl which is substituted (with one or more halogen atoms or hydroxyl, alkyl,

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alkyloxy, alkylthio, alkylsulphinyl, alkylsulphonyl,  
amino, alkylamino or dialkylamino radicals) or a  
radical  $-(CH_2)_nNR'R''$  for which  $R'$  and  $R''$  are defined as  
above and  $n$  is an integer from 2 to 4, or alternatively  
5 if  $X$  represents  $NH$ ,  $R^o$  may also represent the hydrogen  
atom,

$R_2$  is a hydrogen atom or an alkyl radical (1 to 3  
carbons),

$R_3$  is a hydrogen atom or an alkyl, carboxyl,  
10 alkyloxycarbonyl or carbamoyl radical having the  
structure  $-CO-NR'R''$  in which  $R'$  and  $R''$  are defined as  
above,

$R_a$  is a methyl or ethyl radical, and

$R_b$ ,  $R_c$  and  $R_d$  have the definitions below:

- 15 1)  $R_b$  and  $R_c$  are hydrogen atoms and  $R_d$  is a hydrogen  
atom or a methylamino or dimethylamino radical,  
2)  $R_b$  is a hydrogen atom,  $R_c$  is a hydrogen, chlorine  
or bromine atom, or represents an alkenyl radical  
(3 to 5C), and  $R_d$  is a radical  $-NMe-R'''$  for which  
20  $R'''$  represents a radical alkyl, hydroxyalkyl (2  
to 4C), or alkenyl (2 to 8C) which is optionally  
substituted with phenyl, cycloalkyl (3 to 6C)  
methyl, benzyl, benzyl which is substituted (with  
one or more halogen atoms or hydroxyl, alkyl,  
25 alkyloxy, alkylthio, alkylsulphinyl,  
alkylsulphonyl, amino, alkylamino or dialkylamino  
radicals), heterocyclymethyl or heterocyclylethyl  
in which the heterocyclyl portion is saturated or

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- unsaturated and contains 5 to 6 members and 1 or 2 heteroatoms chosen from sulphur, oxygen or nitrogen which is optionally substituted (with a radical alkyl, alkenyl (2 to 8 carbons), cycloalkyl (3 to 6 carbons), heterocyclyl which is saturated or unsaturated (4 to 6 members), phenyl, phenyl which is substituted as defined above for the definition of  $R_1$  or benzyl), or alternatively  $R'''$  represents a radical cyanomethyl, or  $-CH_2CORE$  for which either  $Re$  is  $-OR'e$ ,  $R'e$  being hydrogen, alkyl (1 to 6 carbons), alkenyl (2 to 6 carbons), benzyl or heterocyclylmethyl in which the heterocyclyl portion contains 5 to 6 members and 1 or 2 heteroatoms chosen from sulphur, oxygen or nitrogen, or  $Re$  is an alkylamino, alkylmethylamino, heterocyclylamino or heterocyclylmethylamino radical in which the heterocyclyl portion is saturated and contains 5 to 6 members and 1 or 2 heteroatoms chosen from sulphur, oxygen or nitrogen which is optionally substituted with an alkyl, benzyl or alkyloxycarbonyl radical,
- 3)  $R_b$  is a hydrogen atom,  $R_d$  is a radical  $-NHCH_3$  or  $-N(CH_3)_2$  and  $R_c$  is a chlorine or bromine atom, or represents an alkenyl radical (3 to 5C), (if  $R_d$  is  $-N(CH_3)_2$ ),
- 4)  $R_b$  and  $R_d$  are hydrogen atoms and  $R_c$  is a halogen atom, or an alkylamino or dialkylamino, alkyloxy,

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trifluoromethoxy, thioalkyl, alkyl (1 to 6C) or trihalomethyl radical,

5) Rb and Rc are hydrogen atoms and Rd is a halogen atom, or an ethylamino, diethylamino or

methylethylamino, alkyloxy or trifluoromethoxy, alkylthio, alkylsulphinyl, alkylsulphonyl, alkyl (1 to 6C), phenyl or trihalomethyl radical,

6) Rb is a hydrogen atom and Rc is a halogen atom or an alkylamino or dialkylamino, alkyloxy or

trifluoromethoxy, thioalkyl or alkyl (1 to 3C) radical, and Rd is a halogen atom or an amino, alkylamino or dialkylamino, alkyloxy or trifluoromethoxy, thioalkyl, alkyl (1 to 6C) or trihalomethyl radical,

7) Rc is a hydrogen atom and Rb and Rd represent a methyl radical,

the alkyl, alkenyl or acyl radicals being straight or branched and, unless otherwise stated, the alkyl or acyl radicals containing 1 to 4 carbon atoms, as well

as its salts when they exist.

2. A group B streptogramin derivative according to claim 1, wherein

Y is a nitrogen atom or a radical  $=CR_3-$ ,

R<sub>1</sub> is a hydrogen atom, a radical alkyl (1 to 8 carbons), cycloalkyl (3 to 8 carbons), heterocyclyl which is saturated or unsaturated (3 to 8 members), phenyl, phenyl which is substituted (with one or more amino,

alkylamino or dialkylamino radicals) or a radical  
NR'R", R' and R", which are identical or different,  
being capable of being hydrogen atoms or alkyl radicals  
(1 to 3 carbons), or being capable of forming together  
5 with the nitrogen atom to which they are attached a 3-  
to 8-membered heterocycle optionally containing another  
heteroatom chosen from oxygen, sulphur or nitrogen  
which is optionally substituted with an alkyl radical,  
or alternatively when Y is a radical =CR<sub>3</sub>-, R<sub>1</sub> may also  
10 be halomethyl, hydroxymethyl, alkylthiomethyl in which  
the alkyl portion is optionally substituted with NR'R",  
alkylsulphinylmethyl, alkylsulphonylmethyl,  
acyloxymethyl, cyclopropylaminomethyl or -(CH<sub>2</sub>)<sub>n</sub>NR'R" (n  
being an integer from 1 to 4 and R' and R" being  
15 defined as above), or alternatively if R<sub>3</sub> is a hydrogen  
atom, R<sub>1</sub> may also be formyl or -CONR'R" for which R' and  
R" are defined as above,  
or alternatively when Y is a nitrogen atom, R<sub>1</sub> may also  
be a radical -XR° for which X is an oxygen or sulphur  
20 atom, a sulphinyl or sulphonyl radical, or an NH  
radical and R° is a radical alkyl (1 to 8 carbons),  
heterocyclylmethyl (3 to 8 members) in which the  
heterocyclyl portion is attached to the methyl radical  
by a carbon atom, or a radical -(CH<sub>2</sub>)<sub>n</sub>NR'R" for which R'  
25 and R" are defined as above and n is an integer from 2  
to 4,  
R<sub>2</sub> is a hydrogen atom or an alkyl radical (1 to 3  
carbons),

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R<sub>3</sub> is a hydrogen atom or a carboxyl or alkyloxycarbonyl radical;

R<sub>a</sub> is a methyl or ethyl radical, and

R<sub>b</sub>, R<sub>c</sub> and R<sub>d</sub> have the definitions below:

- 5     •     R<sub>b</sub> and R<sub>c</sub> are hydrogen atoms and R<sub>d</sub> is a hydrogen atom or a methylamino or dimethylamino radical,
- R<sub>b</sub> is a hydrogen atom, R<sub>d</sub> is a radical -NHCH<sub>3</sub> or -N(CH<sub>3</sub>)<sub>2</sub> and R<sub>c</sub> is a chlorine or bromine atom, as well as its salts when they exist.

10

3. A group B streptogramin derivative according to claim 1, wherein Y is a nitrogen atom or a radical =CR<sub>3</sub>-, R<sub>1</sub> is a hydrogen atom, a radical alkyl (1 to 3 carbons), 15 cycloalkyl (3 to 8 carbons), heterocyclyl which is saturated or unsaturated (3 to 8 members), phenyl, phenyl which is substituted with an amino radical, or alternatively when Y is a radical =CR<sub>3</sub>-, R<sub>1</sub> may also be acyloxymethyl,

- 20 or alternatively when Y is a nitrogen atom, R<sub>1</sub> may also be a radical -XR° for which X is an oxygen or sulphur atom or a radical NH and R° is an alkyl radical (1 to 4 carbons) or a radical -(CH<sub>2</sub>)<sub>n</sub>NR'R" for which R' and R" which are identical or different may be hydrogen atoms 25 or alkyl radicals (1 to 3 carbons), or form together with the nitrogen atom to which they are attached a 3- to 8-membered heterocycle optionally containing another heteroatom chosen from oxygen, sulphur or nitrogen

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optionally substituted with an alkyl radical, and n is an integer from 2 to 4,

R<sub>2</sub> is a hydrogen atom or an alkyl radical (1 to 3 carbons),

5 R<sub>3</sub> is a hydrogen atom or an alkyloxycarbonyl radical,

R<sub>a</sub> is a methyl or ethyl radical, and

R<sub>b</sub>, R<sub>c</sub> and R<sub>d</sub> have the definitions below:

• R<sub>b</sub> and R<sub>c</sub> are hydrogen atoms and R<sub>d</sub> is a hydrogen atom or a methylamino or dimethylamino radical,

10 • R<sub>b</sub> is a hydrogen atom, R<sub>d</sub> is a radical -NHCH<sub>3</sub> or -N(CH<sub>3</sub>)<sub>2</sub> and R<sub>c</sub> is a chlorine atom,

as well as its salts when they exist.

4. A group B streptogramin derivative  
15 according to claim 1, which is  
2"-methylpyrido[2,3-5γ,5δ]pristinamycin I<sub>E</sub>.

5. A group B streptogramin derivative  
according to claim 1, which is  
20 2"-cyclopropylpyrido[2,3-5γ,5δ]pristinamycin I<sub>E</sub>.

6. A group B streptogramin derivative  
according to claim 1, which is  
pyrido[2,3-5γ,5δ]pristinamycin I<sub>E</sub>.

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7. A group B streptogramin derivative  
according to claim 1, which is

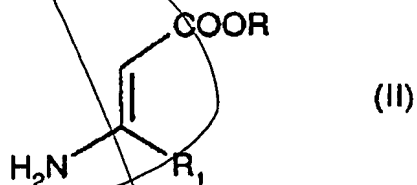
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2"-ethylpyrido[2,3-5 $\gamma$ ,5 $\delta$ ](4 $\zeta$ -methylanino)-(4 $\zeta$ -dedimethylamino)pristinamycin I<sub>E</sub>.

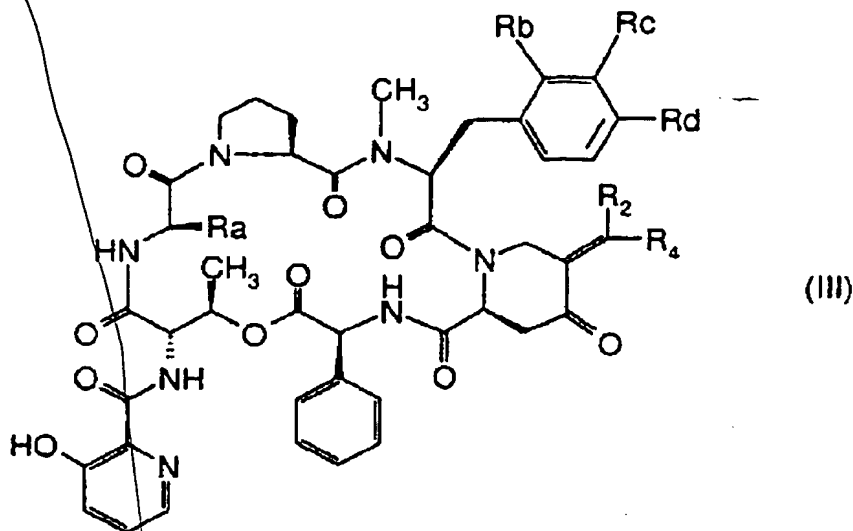
8. A group B streptogramin derivative  
5 according to claim 1, which is  
4 $\epsilon$ -chloro-2"-(ethyl)-pyrido[2,3-5 $\gamma$ ,5 $\delta$ ](4 $\zeta$ -methylanino)-(4 $\zeta$ -dedimethylamino)pristinamycin I<sub>E</sub>.

9. A process for the preparation of a  
10 streptogramin derivative according to claim 1, wherein  
Y is a radical =CR<sub>3</sub>- and R<sub>3</sub> is other than an alkyl  
radical, wherein an enamino ester of general formula:



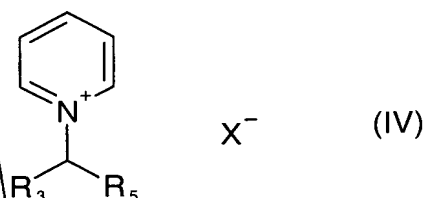
in which R<sub>1</sub> is defined as above and R represents the  
15 residue of an easily hydrolysable ester or an alkyl  
radical, is reacted with the corresponding  
5 $\delta$ -methylenepristinamycin derivative of general  
formula:

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in which Ra, Rb, Rc and Rd are defined as for claim 1,  
 R<sub>2</sub> is defined as for claim 1 and R<sub>4</sub> is a hydrogen atom,  
 or R<sub>2</sub> represents a hydrogen atom and R<sub>4</sub> is a hydrogen  
 5 atom or a dialkylamino radical, followed where  
 appropriate by the conversion of the ester obtained to  
 an acid, and then optionally by its decarboxylation, or  
 by the conversion of the acid to a carbamoyl radical  
 according to the derivative according to claim 1  
 10 desired, and/or followed where appropriate by the  
 conversion of the derivative according to claim 1 for  
 which R<sub>1</sub> is hydroxymethyl to a derivative for which R<sub>1</sub>  
 is a radical formyl, and then where appropriate  
 carboxyl, and then where appropriate alkyloxycarbonyl  
 15 or -CONR'R" and/or optionally followed by the mono-  
 N-demethylation of the derivative according to claim 1  
 for which Rd is a dimethylamino radical to a derivative  
 for which Rd is methylamino, and then optionally  
 followed by the conversion to a salt when they exist.

10. A process for the preparation of a streptogramin derivative according to claim 1, for which Y is a radical  $=CR_3-$  and  $R_3$  is a hydrogen atom or an alkyl radical, wherein a pyridinium salt of general  
5 formula:



in which  $R_3$  is defined as above,  $R_5$  is the residue of a ketone  $R_1-CO-$  for which  $R_1$  is defined as above with the exception of representing a radical  $-NR'R''$ , or  
10 optionally represents a protected hydroxyl radical or a nitrophenyl radical or alternatively  $R_5$  represents the cyano radical so as to obtain a streptogramin derivative for which  $R_1$  is an amino radical, and  $X^-$  is an anion, is reacted with the corresponding 5 $\delta$ -  
15 methylenepristinamycin derivative of general formula (III) defined in claim 2, in which  $R_4$  is a hydrogen atom and  $R_a$ ,  $R_b$ ,  $R_c$ ,  $R_d$  and  $R_2$  are defined as for claim 1, optionally followed by the liberation of the hydroxyl radical or where appropriate the reduction of the  
20 nitrophenyl radical so as to obtain a derivative for which  $R_1$  is an aminophenyl radical, or optionally followed by the reaction of an amine of general formula  $HNR'R''$  with the streptogramin derivative according to claim 1, for which  $R_1$  is halomethyl, so as to obtain the  
25 corresponding derivative for which  $R_1$  is a radical  $-CH_2NR'R''$ , or where appropriate by the conversion of the

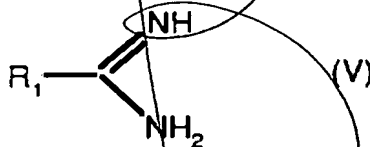
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derivative according to claim 1 for which  $R_1$  is hydroxymethyl to a derivative for which  $R_1$  is a radical formyl, and then where appropriate carboxyl, and then where appropriate alkylloxycarbonyl or  $-\text{CONR}'\text{R}''$  and/or optionally the mono-N-demethylation of the derivative according to claim 1 for which  $R_d$  is a dimethylamino radical to a derivative for which  $R_d$  is methylamino, and then optionally followed by the conversion to a salt, when they exist.

10

11. A process for the preparation of a streptogramin derivative according to claim 1, for which Y is a nitrogen atom, wherein an amidine salt or a derivative of isourea or of isothiurea of general formula:

15



in which  $R_1$  is defined as for claim 1, with the exception of representing a radical  $\text{XR}^\circ$  for which X is sulphonyl or sulphinyl, or a radical  $\text{NR}'\text{R}''$  other than amino, is reacted with a streptogramin derivative of general formula (III) as defined in claim 2, for which  $R_4$  is dialkylamino, and then in order to obtain a streptogramin derivative according to claim 1, for which  $R_1$  is a radical  $\text{XR}^\circ$  for which X is sulphonyl or sulphinyl, the corresponding derivative for which X is a sulphur atom is oxidized, and then in order to obtain

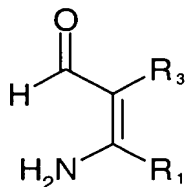
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the streptogramin derivative according to claim 1, for which  $R_1$  is a radical  $NR'R''$ , the sulphonyl derivative obtained is substituted by the action of the corresponding amine  $HNR'R''$  and/or optionally in order to obtain a derivative for which  $R_d$  is methylamino, the mono-N-demethylation of the derivative according to claim 1, for which  $R_d$  is a dimethylamino radical is carried out, and then optionally converted to a salt, when they exist.

10

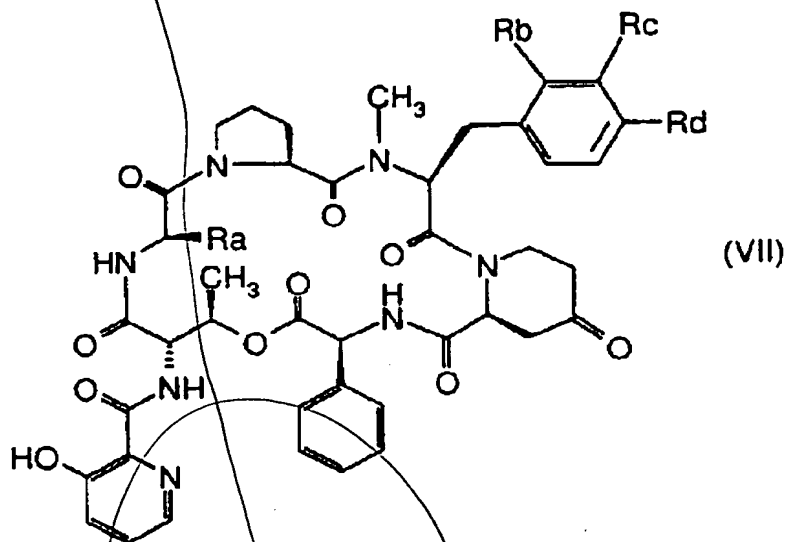
12. A process for the preparation of a streptogramin derivative according to claim 1, for which Y is a radical  $=CR_3-$ ,  $R_1$  is a hydrogen atom, an alkyl, alkenyl, cycloalkyl, aromatic heterocyclyl, phenyl, substituted phenyl, halomethyl, hydroxymethyl, alkyloxymethyl, alkylthiomethyl, alkylsulphinylmethyl, alkylsulphonylmethyl or  $-(CH_2)_nNR'R''$  radical, or alternatively when  $R_3$  is a hydrogen atom, for which  $R_1$  is formyl, carboxyl, alkyloxycarbonyl or  $-CONR'R''$  as defined for claim 1 and  $R_2$  is a hydrogen atom, wherein the formyl enamine of general formula:



(VI)

in which  $R_1$  is a hydrogen atom, an alkyl, alkenyl, cycloalkyl, aromatic heterocyclyl, phenyl, substituted phenyl, hydroxymethyl, alkyloxymethyl, alkylthiomethyl

or  $-(CH_2)_nNR'R''$  radical and  $R_3$  is defined as for claim 1, with the exception of representing carboxyl, is reacted with a streptogramin derivative of general formula:



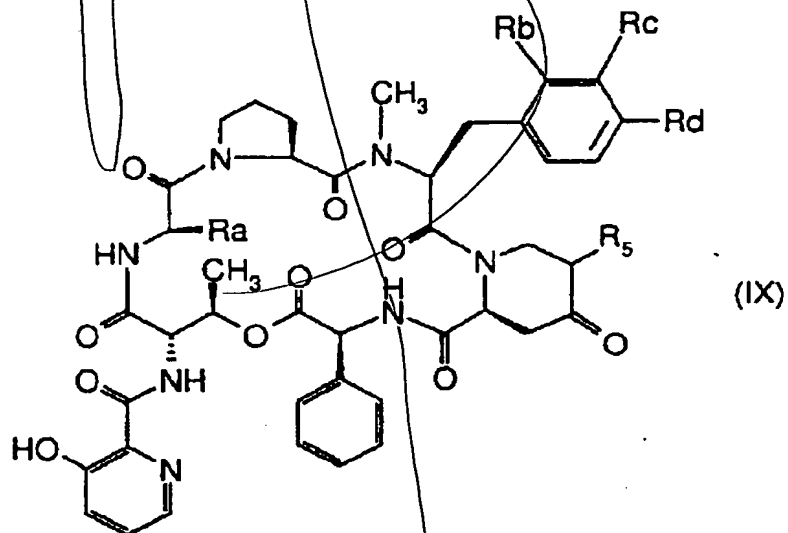
5 in which  $R_a$ ,  $R_b$ ,  $R_c$  and  $R_d$  are defined as for claim 1, followed where appropriate by the conversion of the derivative for which  $R_3$  is amide or ester to a derivative for which  $R_3$  is carboxyl and/or where  
10 appropriate the oxidation of the derivative for which  $R_1$  is alkylthiomethyl to a derivative for which  $R_1$  is alkylsulphinylmethyl or alkylsulphonylmethyl, or where appropriate the conversion of the derivative for which  $R_1$  is a hydroxymethyl radical to a derivative for which  
15  $R_1$  is halomethyl, and then where appropriate the conversion of the derivative for which  $R_1$  is halomethyl to a derivative for which  $R_1$  is  $-CH_2NR'R''$ , or where appropriate the conversion of the derivative according to claim 1, for which  $R_1$  is hydroxymethyl to a  
20 derivative for which  $R_1$  is a radical formyl, and then

where appropriate carboxyl, alkyloxycarbonyl and/or  
-CONR'R", and/or optionally the mono-N-demethylation of  
the derivative according to claim 1, for which Rd is a  
dimethylamino radical to a derivative for which Rd is  
5 methylamino, and then optionally followed by conversion  
to a salt, when they exist.

13. A process for the preparation of a  
streptogramin derivative according to claim 1, for  
10 which Rd is methylamino, wherein the mono-N-  
demethylation of the derivative according to claim 1,  
for which Rd is a dimethylamino radical, is carried out  
and then the streptogramin derivative obtained is  
optionally converted to a salt.

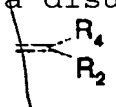
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14. A streptogramin derivative of general  
formula:



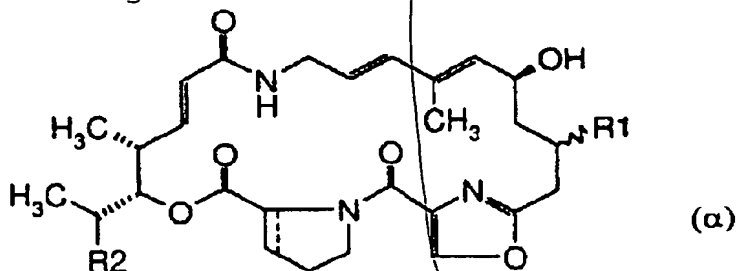
in which Ra is a methyl radical and Rb, Rc and Rd are  
20 defined as in claim 1, or Ra is an ethyl radical and

Rb, Rc and Rd are defined as in claim 1 in 2) to 7) and  
R<sub>5</sub> represents a disubstituted methylenyl radical having

the structure  for which R<sub>2</sub> and R<sub>4</sub> are defined as  
above, or alternatively in which Ra, Rb, Rc and Rd are  
5 defined as for claim 1 in 2), except for R''  
representing ethyl if Rb and Rc are hydrogen, and R<sub>5</sub> is  
a hydrogen atom.

15. A pharmaceutical composition comprising  
10 a group B streptogramin derivative according to claim  
1, in a pure state or in the form of a combination with  
at least one group A streptogramin derivative, where  
appropriate in the form of a salt, and/or in the form  
of a combination with one or more compatible and  
15 pharmaceutically acceptable diluents or adjuvants.

16. A pharmaceutical composition according  
to claim 15, wherein the group A streptogramin  
derivative is chosen from pristinamycin II<sub>A</sub>,  
20 pristinamycin II<sub>B</sub>, pristinamycin II<sub>C</sub>, pristinamycin II<sub>D</sub>,  
pristinamycin II<sub>E</sub>, pristinamycin II<sub>F</sub>, pristinamycin II<sub>G</sub>  
or from known semisynthetic derivatives or from the  
derivatives of general formula:





in which  $R_1$  is a radical  $-NR'R''$  for which  $R'$  is a hydrogen atom or a methyl radical,  $R''$  is a hydrogen atom, an alkyl, cycloalkyl, allyl, propargyl, benzyl or  $-OR'''$ ,  $R'''$  radical being a hydrogen atom, an alkyl, 5 cycloalkyl, allyl, propargyl or benzyl radical, or  $-NR_3R_4$ , it being possible for  $R_3$  and  $R_4$  to represent a methyl radical, or to form together with the nitrogen atom to which they are attached a saturated or unsaturated 4- or 5-membered heterocycle which may in 10 addition contain another heteroatom chosen from nitrogen, oxygen or sulphur,  $R_2$  is a hydrogen atom or a methyl or ethyl radical, and the bond  $---$  represents a single bond or a double bond, as well as their salts.

- 15 17. A combination of a group B streptogramin derivative according to claim 1 with at least one group A streptogramin derivative as defined in claim 16.

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